**WHAT IS CLAIMED:**

1. A method of producing a substrate suitable for separation of a target molecule from a fluid medium, said method comprising:

providing an emulsion comprising a water phase in an oil phase, wherein the oil phase comprises a polymerizable monomer and the water phase comprises the target molecule;

coating a substrate, having pores extending from one side of the substrate to another side of the substrate, with the emulsion;

polymerizing the monomer in the emulsion coated substrate; and

removing water and the target molecule from the polymerized, emulsion coated substrate, whereby the substrate is imprinted with the target molecule and, therefore, is suitable for separation of the target molecule from a fluid medium.

2. The method of claim 1, wherein either the oil phase or the water phase comprises a functional group having both a hydrophilic region and a hydrophobic region, wherein the functional group bonds to the target molecule.

3. The method of claim 2, wherein covalent bonds bond the functional group to the target molecule.

4. The method of claim 3, wherein the functional group is selected from the group consisting of a succinimide group, a boronic acid, an amide group, a group which achieves an epoxy ring opening reaction, a group which forms thiol-thiol interactions, a group which undergoes cyanogen bromide reactions, a group which undergoes periodate oxidation reactions, an oxirane group, a triazine group, a group which undergoes carbonyl imidazole activation, a group which undergoes substituted sulfone chloride activation, and a group which undergoes fluoromethyl pyridinium salt reactions.

5. The method of claim 2, wherein non-covalent bonds bond the functional group to the target molecule.

6. The method of claim 5, wherein the functional group forms hydrogen bonds selected from the group consisting of N-H bonds, O-H bonds, F-H bonds, van der Waals interactions, $\pi$-$\pi$ interactions, metal-chelate interactions, salt bridges, hydrophobic interactions, and combinations thereof.

7. The method of claim 5, wherein the functional group is selected from the group consisting of alkanethiols, silanes, amino acids, functionalized acid azide bolaamphiphiles, poly(ethylene glycol) or ethylene glycol, oleic acid, 2-(trifluoromethyl) acrylic acid, methacrylic acid, receptors which interact with specific groups on proteins, and combinatorial-derived strongly binding molecules to protein epitopes or specific amino acids.

8. The method of claim 1, wherein the oil phase further comprises a polymerization initiator.

9 The method of claim 1, wherein the oil phase further comprises a cross-linking agent.

10. The method of claim 1, wherein the oil phase further comprises an emulsion stabilizing agent.

11. The method of claim 1, wherein the substrate is selected from the group consisting of beads, membranes, and functionalized surfaces.

12. The method of claim 11, wherein the substrate is a bead formed from a material selected from the group consisting of silica, agarose, polyacrylamide, and alumina.

13. The method of claim 11, wherein the substrate is a membrane formed from a material selected from the group consisting of polypropylene, polyethylene, polysulfones, fluoro-polymers, poly(vinylidene difluoride), celluloses, polycarbonate,

polyurethane, polyamides, microporous glass, silver, steel, alumina, silica, and silicates.

14. The method of claim 11, wherein the substrate is a functionalized surface, wherein the surface is functionalized to expose organosilanes or self-assembled monolayers.

15. The method of claim 1, wherein said polymerizing is carried out by applying electromagnetic radiation to the emulsion coated substrate.

16. The method of claim 1, wherein the emulsion is coated on the substrate as a thin film.

17. The method of claim 1 further comprising:

sonicating the emulsion prior to said polymerizing to form small water droplets.

18. The method of claim 1, wherein the target molecule is a molecule of biological orgin.

19. The method of claim 18, wherein the target molecule is a protein, a peptide, a nucleic acid molecule, a sugar, a lipid, a glycoprotein, a glycolipid, or insulin.

20. The method of claim 19, wherein the target molecule is part of a virus, a prokaryote, or a eukaryote.

21. The method of claim 1, wherein the target molecule is a chemical compound.

22. The method of claim 1, wherein said removing is carried out by contacting the polymerized emulsion coated substrate with a weak acid, a solvent, or microwave radiation.

23. An article suitable for separation of a target molecule from a fluid medium comprising:

a substrate, having pores extending from one side of the substrate to another side of the substrate, and

a coating over the substrate imprinted with cavities having a conformation substantially corresponding to the target molecule, wherein the coating comprises a functional group extending into the cavity and suitable to bind to the target molecule.

24. The article of claim 23, wherein covalent bonds bond the functional group to the target molecule.

25. The article of claim 24, wherein the functional group is selected from the group consisting of a succinimide group, a boronic acid, an amide group, a group which achieves an epoxy ring opening reaction, a group which forms thiol-thiol interactions, a group which undergoes cyanogen bromide reactions, a group which undergoes periodate oxidation reactions, an oxirane group a triazine group, a group which undergoes carbonyl imidazole activation, a group which undergoes substituted sulfone chloride activation, and a group which undergoes fluoromethyl pyridinium salt reactions.

26. The article of claim 23, wherein non-covalent bonds bond the functional group to the target molecule.

27. The article of claim 26, wherein the functional group forms hydrogen bonds selected from the group consisting of N-H bonds, O-H bonds, F-H bonds, van der Waals interactions, $\pi$-$\pi$ interactions, metal-chelate interactions, salt bridges, hydrophobic interactions, and combinations thereof.

28. The article of claim 26, wherein the functional group is selected from the group consisting of alkanethiols, silanes, amino acids, functionalized acid azide bolaamphiphiles, poly(ethylene glycol) or ethylene glycol, oleic acid, 2-(trifluoromethyl) acrylic acid, methacrylic acid, receptors which interact with specific groups on proteins, and combinatorial-derived strongly binding molecules to protein epitopes or specific amino acids.

29. The article of claim 23, wherein the substrate is selected from the group consisting of beads, membranes, and functionalized surfaces.

30. The article of claim 23, wherein the substrate is a bead is formed from a material selected from the group consisting of silica, agarose, polyacrylamide, and alumina.

31. The article of claim 23, wherein the substrate is a membrane selected from the group consisting of polypropylene, polyethylene, polysulfones, fluoro-polymers, poly(vinylidene difluoride), celluloses, polycarbonate, polyurethane, polyamides, microporous glass, silver, steel, alumina, silica, and silicates.

32. The article of claim 23, wherein the substrate is a functionalized surface, wherein the surface is functionalized to expose organosilanes or self-assembled monolayers.

33. The article of claim 23, wherein the polymer is coated on the substrate as a thin film.

34. The article of claim 23, wherein the target molecule is a molecule of biological origin.

35. The article of claim 34, wherein the target molecule is a protein, peptide, a nucleic acid molecule, a lipid, a glycoprotein, a glycolipid, a sugar, or insulin.

36. The article of claim 34, wherein the target molecule is part of a virus, a prokaryote, or a eukaryote.

37. The article of claim 23, wherein the target molecule is a chemical compound.

38. A method of separating a target molecule from a fluid comprising:
providing the article of claim 23 and
contacting a fluid potentially containing the target molecule with the article under conditions effective to remove the target molecule from the fluid.

39. The method of claim 38, wherein the fluid is a liquid.

40. The method of claim 38, wherein the fluid is a gas.

41. The method of claim 38, wherein covalent bonds bond the functional group to the target molecule.

42. The method of claim 41, wherein the functional group is selected from the group consisting of a succinimide group, a boronic acid, an amide group, a group which achieves an epoxy ring opening reaction, a group which forms thiol-thiol interactions, a group which undergoes cyanogen bromide reactions, a group which undergoes periodate oxidation reactions, an oxirane group, a triazine group, a group which undergoes carbonyl imidazole activation, a group which undergoes substituted sulfone chloride activation, and a group which undergoes fluoromethyl pyridinium salt reactions.

43. The method of claim 38, wherein non-covalent bonds bond the functional group to the target molecule.

44. The method of claim 43, wherein the functional group forms hydrogen bonds selected from the group consisting of N-H bonds, O-H bonds, F-H bonds, van der Waals interactions, $\pi$-$\pi$ interactions, metal-chelate interactions, salt bridges, hydrophobic interactions, and combinations thereof.

45. The method of claim 43, wherein the functional group is selected from the group consisting of alkanethiols, silanes, amino acids, functionalized acid azide bolaamphiphiles, poly(ethylene glycol) or ethylene glycol, oleic acid, 2-(trifluoromethyl) acrylic acid, methacrylic acid, receptors which interact with specific groups on proteins, and combinatorial-derived strongly binding molecules to protein epitopes or specific amino acids.

46. The method of claim 38, wherein the substrate is selected from the group consisting of beads, membranes, and functionalized surfaces.

47. The method of claim 46, wherein the substrate is a bead formed from a material selected from the group consisting of silica, agarose, polyacrylamide, and alumina.

48. The method of claim 46, wherein the substrate is a membrane formed from a material selected from the group consisting of polypropylene, polyethylene, polysulfones, fluoro-polymers, poly(vinylidene difluoride), celluloses, polycarbonate, polyurethane, polyamides, microporous glass, silver, steel, alumina, silica, and silicates.

49. The method of claim 46, wherein the substrate is a functionalized surface, wherein the surface is functionalized to expose organosilanes or self-assembled monolayers.

50. The method of claim 38, wherein the polymer is coated on the substrate as a thin film.

51. The method of claim 38, wherein the target molecule is a biomolecule.

52. The method of claim 51, wherein the target molecule is a protein, a peptide, a nucleic acid molecule, a sugar, a lipid, a glycoprotein, a glycolipid, or insulin.

53. The method of claim 51, wherein the target molecule is part of a virus, a prokaryote, or a eukaryote.

54. The molecule of claim 38, wherein the target molecule is a chemical compound.